

Diffusion of Natural Gas Odorants in Nitrogen

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Natural gas as it occurs naturally has little or no perceptible odor. In order to make natural gas detectable without the use of instrumentation, the gas is odorized with one or more of a series of sulfur compounds, in concentrations between 1 and 4 ppm, by mass. Often, however, the odor of the treated gas will become imperceptible. This is termed odorant fading. The reasons for odorant fading are largely unknown, although speculation includes partitioning into condensate and oils, adsorption on pipeline walls, preferential transport, etc. Nearly all of these mechanisms are in some way mass transfer dependent. To adequately model the fading phenomena, hydrodynamic models have been proposed, all of which require the binary interaction diffusion coefficient, D_{12} , at pipeline temperatures and pressures as an input. In this talk, an apparatus to measure D_{12} based on the Taylor-Aris technique will be described. This apparatus, which is based upon a physicochemical adaptation of a supercritical fluid chromatograph, has been modified to detect sulfur compounds. The details of the modification will be briefly discussed. Then, a detailed discussion of the measured D_{12} values will be presented. The relationship of the measurements in nitrogen to those in natural gas will then be discussed.